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SOURCE Nauka i Zhizn', Vol XIX, No 11, pp 21-23.DEVELOPMENTS IN SOVIET CHEMISTRY

Acad S. I. Vol'fkovich, Stalin Prize Laureate

The production of inorganic acids, alkalies, salts, and fertilizers [i. e., the production of the heavy inorganic chemical industry] will increase at a rapid rate during the current Five-Year Plan. The output of inorganic fertilizers will be 88% higher in 1955 as compared with 1950. An additional quantity of fertilizers amounting to millions of tons will be supplied to agriculture both by expansion of plant capacity and by improvement of technological processes at plants already in operation.

Production of granulated fertilizers will be considerably expanded. During the next few years, production of highly concentrated fertilizers will be developed. These fertilizers will contain a quantity of useful nutritive ingredients two to three times greater than superphosphate. Thus, double superphosphate, which contains 45% or more of phosphorus pentoxide, is 2.5 times more concentrated than ordinary superphosphate, which contains only 18-20% of phosphorus pentoxide. Other concentrated fertilizers are precipitate (32-44% of phosphorus pentoxide) and ammophos (50% of phosphorus pentoxide). The USSR chemical industry also produces large quantities of granulated ammonium nitrate, which is superior to pure powdered ammonium nitrate for use as a fertilizer. During the new Five-Year Plan, phosphate slags will be used as fertilizers. The increase in hydroelectric power and the greater availability of fuel resources will permit production of fertilizers by thermal methods without the use of acids.

The increased use of fertilizers (both inorganic and organic), together with the application of improved agricultural methods, will result in a greatly expanded production of foodstuffs and of crude materials for industry.

Soviet agricultural chemists have found that so-called microfertilizers [trace element fertilizers] are very effective in increasing agricultural yields, although they are applied in quantities amounting to only a few kilograms

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per hectare. These microfertilizers contain compounds of manganese, boron, zinc, and several other elements. The production and application of microfertilizers as well as of plant-growth stimulants will be steadily expanded.

During recent years, considerable progress has been achieved in the manufacture of new insectofungicides containing chlorine, phosphorus, sulfur, mercury, and other elements. These include the well-known insecticides DDT and hexachlorocyclohexane as well as NIUF-2 and NIUF-100 (thiophos). Through the use of chemical pesticides, losses due to harmful insects such as *Bothynoderes punctiventris* [which damages sugar beets] and *Pentatomidae* [*Eurigaster intergiseis* and other species, which damage grain crops and other crops], to rodents, and to fungus diseases of plants have been sharply reduced. Chemical weed killers are also being used to advantage in the fields.

One of the fundamental activities of the chemical industry is the manufacture of soda. In 1955, the output of calcined soda will be 84% higher than in 1950 and that of sodium hydroxide 79% higher. The heavy organic industry will also be considerably expanded during the current Five-Year Plan.

USSR science has developed efficient methods for the production of synthetic rubber from petroleum gases. This important branch of the chemical industry will be expanded by every possible means during the current Five-Year Plan, both in regard to the volume of production and from the standpoint of making available new types of rubber.

The use of petroleum and of calcium carbide as initial materials for the production of synthetic rubber will release for other purposes a considerable amount of grain and potatoes, which served as a source of alcohol for the production of synthetic rubber according to S. V. Lebedev's method. The production of synthetic alcohol should be expanded not only for the needs of the synthetic rubber industry, but also for other technical applications. During the current Five-Year Plan, the output of synthetic rubber will rise by 82%, while the production of synthetic fibers will be increased 4.7 times.

Extensive research has enabled Soviet chemists to create new, very effective adhesives, which are capable of firmly cementing together all kinds of metals, stones, glass, wood and other materials. This achievement of science has opened new possibilities in building technology and in the construction of machines. Significant progress has also been made in research and development pertaining to silicon-organic compounds.

Rapid advances have taken place in the plastics industry. Many kinds of plastics are replacing nonferrous metals. Of great importance for technology and science are some synthetic resins which act as effective adsorbents for liquids and gases. Some of these resins are used in analytical chemistry and practical technology as ion-exchange agents.

USSR chemistry participates directly in the realization of the Stalin plans for the transformation of nature and renders important aid to the great construction works of Communism in developing locally produced strong construction materials, in devising procedures for the reinforcement of sands and for the prevention of the corrosion of metals, etc. In turn, the new large hydroelectric power plants on the Volga, Dnepr, Kama, Irtysh, and other rivers will contribute to the development of new, powerful electrochemical and electrothermal industries producing chemicals, aluminum, and other metals. The increased availability of electric power supplied at a lower cost will result in multifarious and diversified applications of oxygen. During the new [current] Five-Year Plan, the use of oxygen will be widely introduced into the technological processes of the chemical, metallurgical, gas, cement, and cellulose industries.

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In connection with the progress of radiochemistry and the achievements of nuclear physics and chemistry, several hundred radioactive and stable isotopes have become available for use in scientific research and can henceforth be used on a wide scale.

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